

POCKET SERIES NO. 467
Edited by E. Haldeman-Julius

Evolution Made Plain

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HALDEMAN-JULIUS COMPANY
GIRARD, KANSAS



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EVOLUTION MADE PLAIN

The time has come when scientific truth must cease to be the property of the few—when it must be woven into the common life of the world.—Agassiz.

*Read not to contradict and confute, nor to believe and take for granted, * * * but to weigh and consider.—Bacon.*

The man who will not investigate both sides of a question is dishonest.—Abraham Lincoln.

Intolerance is the product of an ignorant, primitive mind. We should tolerate anything of an intellectual nature except intolerance. Freedom of opinion is the root, flower and fruit of liberty—its very essence.—Anonymous.

WHAT EVOLUTION IS AND IS NOT

Addison said, "The real substance of a bulky volume can be condensed into a small pamphlet"; and it is believed that the fundamental principles of a great scientific discovery like evolution can be outlined in a few pages, and in a way so plain and in words so simple that any one who is at all interested can get a fairly good understanding of its scope. With this idea in mind an attempt is here made to explain evolution, to tell what some of its laws are and how they work, and to present briefly some of the evidences that support the doctrine.

Contrary to popular belief evolution is not

confined to the origin of man, but it explains how all living things have become as we now see them, and how and why the most of them are being changed. It teaches that all living species of plants and animals, including man, also the thousands of extinct species which have left their fossil records in stratified rocks, have been developed from a few small and simple forms—probably one, and that a mere cell. And it shows, too, that this has been done by the operation of natural laws, the same laws we see in operation today.

Evolution does not teach that every living thing is “day by day, in every way, growing better and better.” On the contrary, it shows that many species deteriorate, are driven to the wall and become extinct, while only the best fitted survive. For instance, of the twenty-five orders of reptiles in the Jurassic period—known to the geologists by their fossils—only five have come down to our times. But out of the reptilian orders, then the highest forms of living things, have come the superior orders of later times—birds and mammals. And this is evolution.

We sometimes hear the statement that scientists are not in agreement in regard to evolution. The point of disagreement is in respect to the part played by natural selection in the development of species, and not as to whether or not evolution is a fact. The discussion is in regard to the *how* of the fact and not the fact itself. No great scientist since Agassiz, who died in 1873, has opposed evolution.

Neither does evolution teach that one species

may develop into another, as that the goat may develop into the deer, or that the ape may evolve into man. For one species to become another existing species it would have to take the back track to the point where the two species began to diverge and travel the other route—which of course would be impossible. This may help in getting the idea: the larger divisions and groups of animals (fishes, reptiles, mammals, etc.) may be compared to the main or primary branches of a tree, the families and orders (as the deer, the cat, and the dog) to the secondary branches growing from the primary ones, and the species to the further divisions of the secondary branches. Now we can see that one species can no more become another—that is, any now existing—than one branch of a tree can become another. A species can, in time, if subject to the proper conditions, split into varieties which, if developed far enough, may become distinct species. But no one of these species can be said to have been evolved from a contemporary species, for all have been changed, and the stock from which they came has ceased to exist as such. Each of the existing species would have a distinct name such as, for instance, cow, bison, Cape buffalo, yak. Now suppose the fossil remains of the common ancestor of the above-named species were found—what should it be called, cow, bison, Cape buffalo, or yak? It would be neither, for it would probably differ as much or more from them as they differ among themselves. Thus is laid to rest the idea that evolution is a theory that man was evolved from, or by way of, the monkey or the

ape. They are as distinct species as is man himself.

GEOLOGICAL EVIDENCES OF PROGRESSIVE DEVELOPMENT

All life on this globe is divided into two great classes, vegetable and animal. All animals belong to one or the other of two grand divisions: invertebrates (those without backbones) and vertebrates (the backboneed). The latter class, comprising more than 30,000 known species, is subdivided into five great groups: fishes, frogs, reptiles, birds and mammals. At the top of the highest group, mammals (those which bring forth their young alive), is man. Birds and mammals were evolved from the reptiles—both offshoots of the same stock—and are contemporaneous in development and descent.

The various classes and groups of animals, both in the order of development from the simple to the complex and in the time of their arrival, are in the order named: first the small, one-celled animals (many species of which are found today) then more complex organisms of the invertebrate division, later the fishes, amphibians, reptiles, and mammals, including man.

The story told by the geologist is in perfect agreement with those laws of development which we call evolution. The lowest, simplest forms of life are the oldest as is shown by their fossil remains (bones, shells, etc.) found in stratified or water-laid rock. These fossils were deposited in sediment as it formed in sea

and lake thousands and millions of years ago. In the movements of the earth's crust the sediment of ancient sea and lake bottoms was raised above the water and became land, the sediment hardening into rock. All sediment is formed on a level, but in its up-heaval—generally slow, sometimes violent—it is often tilted at various angles exposing its edges. It is from this out-cropping, stratified rock (the sum of which is often several miles in depth) that forms the outer part of the earth's crust that the geologist reads the story of creation.

The oldest or lowest water-laid rock is the archæan in which there are no fossils. Above this, in the stratum formed in a later period are found evidences of the beginnings of life. After millions of years of growth and development the shell fish, at the top of the invertebrate group, is produced. Then comes a period of uncounted millions of years in which the fishes, the lowest of the vertebrates, are being developed—millions of years to bridge the chasm between the two main divisions of the animal kingdom; millions of years to produce a backbone! Other long periods of time, filled with change and development, come and go—the age of the coal plant and of the frogs, succeeded by the age of reptiles, giant monsters, cold-blooded and of small brain, swarming sea and land. Long ages pass; the reptilian monsters have become extinct, leaving as their representatives only a few dwarfed species—the crocodile, the lizard, the snake, the turtle. Of mammals the lowest orders arrive first, followed by the more highly developed until finally man appears.

Naturally, fossils of land animals are few compared with those of marine animals. Practically all the remains of the latter sank and were covered with the slowly accumulating sediment, while the bones of the former only rarely were swept out to sea and lake. Rarest of all fossils are those of man. A few have been found antedating history by several thousand years, but we get a far more complete knowledge of our primitive ancestors from the tools and weapons that they left in sediment and drift before the dawn of the present era. We can trace his progress upward through all degrees of culture from the rude old stone age of a hundred thousand years ago, through the new stone age, the copper and bronze age, and the iron age to the beginning of written records.

Yet, so old is our planet and so long ago since life dawned on it—so long even since the first mammals appeared—that man's arrival a hundred-or-so thousand years ago is but as yesterday. To paraphrase an illustration by Slade and Ferguson: "Suppose we take the earth as 365 million years old, and consider this period as a year, one million years being taken as a day." Then, on this scale the vertebrates came into existence late in the summer or early fall, the mammals not earlier than the end of November, and "the whole period of man is not likely to have been further back than the evening of December 31st, and the earliest historic evidence (in Egypt) is not more than ten minutes before the last midnight"—"the last midnight," of course, being the present.

EVIDENCES OF EVOLUTION

Of the many evidences of the kinship of all animals including man only a few can be mentioned in this book. All animals, man included, are constructed on the same general plan. They have the same organs—brain, heart, lungs, digestive tract, nerves, skin—performing the same functions for the same purposes. The skeleton of man can be compared, bone for bone, with that of a monkey, bat or seal. The bat's membranous wing is ribbed with bones corresponding to the bones of a monkey's or a man's hand. The wing of both the bat and the bird has one bone from the shoulder to the first joint, and two bones from the first to the second joint, like the fore leg of quadrupeds and the arm of man—thus proving that the fore leg, the arm and the wing are only modifications of the same limb. The biped bird and biped man are modified quadrupeds.

All the five hundred muscles of the human body correspond with the muscles of other mammals. Even the brain, wherein man differs most from the lower animals, has the same chief fissures and folds in both man and the animal nearest man, the orang-outang. Man and the other animals have the same five senses and the same sense organs. They in common have the same basic emotions, such as surprise, jealousy, pride, hatred, shame, anger, grief, affection, and a sense of the ludicrous. Bucks says, "So is man's so-called human mind rooted in the senses and the instincts of all his ancestral species; and not only

so, but these senses and instincts still live in him, making up, indeed, far the larger part of his current everyday life; while his higher psychical life is merely the outgrowth and flower of them."

The old formula was: "Man is governed by reason; brutes by instinct." But science has proved that lower animals are not guided altogether by instinct, that many of their actions are the results of mental activities remarkably similar to reasoning. On the other hand man himself has instinct—and well for him that he has, for his reason, as yet, is only partially developed. If we will but subtract from the sum of man's actions, not only those prompted by instinct, but those also that result from habit, custom, prejudice, and the emotions of anger, revenge, vanity, and other elemental passions, we will not feel like crying from the housetops that "man is governed by reason."

Man and the lower animals have similar diseases. He is liable to contract from, or communicate to them, such diseases as glanders, hydrophobia, cholera, tuberculosis. Drugs, tobacco and alcohol have the same effects on animals as on us.

Of course the dog, the ape, the horse and man do not perfectly agree in their corresponding parts and in their natures—if they did they would belong to the same species—but their similarities are so remarkable that they have a profound meaning for the thoughtful, however meaningless they may be to the thoughtless and the prejudiced.

In embryonic development are found evidences not only of man's close relationship

with all animals but of the long, long route he and they have travelled in their common descent from the simpler forms of life. Darwin says that the whole process of reproduction, from the first act of courtship by the male to the birth and nuturing of the young, is very much the same in all mammals.

The lowest forms of animal life, the one-celled animals, are without sex, and multiply by dividing into half, each half developing into a complete cell, which in turn is subjected to the same dividing process. Many species of these lowly organisms still exist, never having developed further than the unicellular stage. All higher forms, as of fishes, reptiles, birds, mammals, begin life at this point—as a single cell. The cell, germ, or ovum of an embryo (the young of a mammal before birth) when fertilized divides, forming two cells, the two divide into four, the four into eight, and so on, until there is a colony of similar cells en-massed, and with a little rod of tissue—the beginnings of the spinal column—running through. The embryo at this stage is passing beyond the lowest grand division, the invertebrates. Entering the vertebrate division the embryo passes into the fish group. Deep grooves, gill slits, appear on the side of the neck of the embryo and six pairs of arched branches of arteries arise, just as in fishes, as if to give blood to the gills. Later all but one of these pairs disappear. The arms and legs of the child, like the legs of all other embryos, begin to develop, and continue to do so for some time, on the same plan as the fins of fishes. Further along in its development the embryo

assumes all the characteristics of the quadruped even to the tail which in the human embryo at this stage is longer than its legs. During the sixth month the entire body of the human foetus, except the palms and soles, is covered with fine, woolly hair.

Thus far the human embryo has developed in the same way, has undergone the same changes, has passed through precisely the same stages as the embryo of other animals. In its further development it leaves them all behind except those nearest man. Its tail disappears, and it now has an opposable or thumb-like great toe which with the monkey and the ape is a permanent characteristic. It is only in the latest stages of development that the human embryo presents marked differences from the embryonic ape.

Of the fact that the embryo in its development from a single fertilized cell passes through all the stages representative of the principal animal divisions, and in a progressive order from the simple to the complex and highly developed, there is no explanation but that of heredity and descent—of descent of the higher animals from the lower with heredity transmitting the records of the remote ancestral stages. Each stage, as of the fish, the quadruped, the ape, is a sign board along the route of man's descent. The nine months' embryonic period of each of us is an epitome of the history of the race down to the human period.

Nor do the evidences of race-history as revealed by the child cease with its birth. The babe is nearer the lower mammals than is the

adult man. When it acquires the use of its limbs it begins life as a quadruped. Its blundering attempts in learning to stand erect and walk is evidence of the fact that man's peculiar mode of locomotion is a late acquirement. Like the lower animals the babe makes known its wants by means of natural language; it later acquires artificial or spoken language in the same slow, laborious way that it was acquired by the race. At the average age of three years the child has become self-conscious; his mind has passed the mental stage of all animals below man. Psychically he has become man.

In certain periods of youth the child is a tree-climber, a cave-digger, childish sports that hark back to periods passed through hundreds of thousands of years ago in the childhood of the race. At a certain stage his emotional nature has developed to the point that he is conscious of wrong-doing. This is what the old theologians called "the age of accountability." If there is a grain of truth in the chaff-heap of Mosaic mythology the fall of Adam indicates the point in the development of the race when conscience had dawned and feelings of remorse had begun to stir within. Man had reached the age of accountability. But prior to the "fall" there was a rise.

Rudiments or vestiges are also evidences of the descent (or ascent) of the higher forms of life from the lower. Rudiments are incomplete parts of the body which have become arrested in their development, and which are now of no use, nor would now be of use if fully developed. They are relics handed down to us by the

laws of heredity from a long-past age when they were well developed and useful to our lowly ancestors. Though we outgrow primitive conditions and stages of development we can not get rid of the past, but must drag it around with us as the snail drags its shell.

All the higher animals bear within their bodies the reminders of a humble origin, some of which are: The incisor teeth of certain grass-eating animals, so rudimentary as never to cut through; the small hoof points of the cow which do not touch the ground, and the rudimentary fifth and sixth teats on the hinder part of her udder; the splint bones in the horse's leg—vestiges of toes when he was a three-toed animal; the scanty, downy hair that covers the human body.

Certain muscles by which animals can twitch the skin are inherited by some persons who can move the scalp and the ears. The sense of smell in civilized man has become almost rudimentary. The vermiform appendix is not only useless but often injurious. It points back to the time when our ancestors were strict vegetarians—grass-eaters. In the *os coccyx* man carries about with him the rudimentary bones of a tail. This, with the fact that the human embryo at one stage has a tail longer than its legs, is Nature's everlasting reminder that proud man's remote ancestor was adorned with a tail.

In order to get as clear an idea as possible of man's exact place in the animal scale we should note the points wherein man differs from his nearest relatives—the orang, the go-

rilla, the chimpanzee, the gibbon—as well as the points wherein he agrees with them. Here are the most obvious points of dissimilarity. Man walks erect, though in his first year he goes on all fours, while apes only occasionally walk, and that in a semi-erect position, their arms, longer than their legs, reaching the ground, knuckles touching. The nose of the ape is small, undeveloped; the canine teeth are very large; the mouth projects, and there is no chin. The entire body except the palms and soles is covered with hair. The brain capacity of the ape is less than half that of man.

On the other hand there are more points of similarity than of dissimilarity between man and the apes; and if the points wherein they differ be examined they will be found to be differences in degree rather than in kind. The higher apes are entirely without tails; the embryo of the ape, like the human foetus, loses its tail sometime before birth. The young ape (monkey also) is born in almost as helpless a condition as is the human babe. The female ape has two mammary glands (udders) and they are always on the chest. Adult apes have the same teeth as man—thirty-two in number, incisors, canines, premolars, molars. They have the same 200 bones, the same 500 muscles, the same organs and glands. On their toes and fingers they have flat nails, like man, instead of claws. On account of the ape's opposable great toe they were formerly classed as four-handed; but this was an error. In all essential respects their legs terminate in feet.

Like man they are bipeds, and like man they have two hands. The brain of the ape, though much smaller than man's, as we would expect it to be, is constructed on the same general plan as his with the same main fissures and the same groups of cells. There is no "missing link" in the plan and structure of man's brain, whatever difference there may be between his and the ape's in capacity.

No scientist has ever been so foolish as to say that man and the apes belong to the same species. There are four species of the higher apes and one of man, though the one species of man is divided into five varieties, called "races." Varieties differ less widely than species. Individuals within a variety also differ. Differences are no bar to unity if they are nullified and outweighed by similarities.

Finally, let us keep in mind that while man has departed from the ancestral type, developing in one direction, the apes have gone off in another and have acquired characteristics peculiarly their own. Resemblance in a babe and a young ape is far greater than in a man and an adult ape. The same is true of the young of all allied species. This divergence from birth of the adults of different species is strong evidence of a common origin.

These are only a few of the hundreds of evidences proving that man fits into the same creative scheme with the lower animals—proving that he, in common with them, has developed from still lower forms, and that, as a product of the creative forces of Nature, he is wholly subject to her laws.

CONNECTING LINKS

There is a greater unity of all life than the many divisions and sub-divisions of the analyst would seem to warrant. The dividing lines between the different classes, orders, families and species are more apparent than real, the barriers of separation not so impassable as appear at first sight.

To begin at the bottom, there is no hard and fast line drawn between living and non-living matter—or at least it is not always easy to say where the line should be drawn. Tyndall says, "The tendency of modern science is to break down the wall of partition between the organic and the inorganic, and to reduce both to the operation of forces which are the same in kind, but which are differently compounded."

Passing on to the first grand division of life, it would seem that nothing could be plainer than the line of cleavage between vegetable and animal life. Yet there is a twilight zone between the two where each shades off toward the other, and which is inhabited by several living species of so doubtful a nature that scientists cannot agree as to which of the two great kingdoms they belong. These doubtful organisms are claimed by both the botanist and the geologist and are described in the textbooks of both. Really they do not belong to either division, but are simply organisms that have not risen in the scale of life to the diverging point of the animal and vegetable kingdoms.

Ascending the animal scale we come to the line separating the invertebrates from the ver-

tebrates. Here, on the invertebrate side are species that have the beginnings of a backbone—an elastic smooth cord—and gill-slits, thus proving their relationship with the fishes, the lowest of the vertebrates.

The connecting link between the fish and the reptile groups is the amphibians—frogs, newts, salamanders, etc. The frog in its tadpole stage is a fish, but acquiring legs and lungs it becomes an air-breather, a land animal.

Between the reptile and the bird, and having certain characteristics of both, there are at least three extinct species, known by their fossils. One of these, *archaeopteryx*, had the skeleton and feathers of a bird and a reptile tail composed of twenty vertebrae. Another was a flying reptile with a bird-shaped head.

Reptiles (snakes, lizards, turtles, alligators, etc.) are cold-blooded, egg-laying animals. Birds retain the egg-laying characteristic of reptiles but are warm-blooded like the mammals. The latter differ from both birds and reptiles in producing their young alive and suckling them. Between the mammal and its ancestor, the reptile, but classed with the former is the duck-mole of Australia. It is an egg-laying, web-footed, duck-billed quadruped. After its young are hatched they are suckled in a sort of mammary pouch which is without nipples. Above the duck-mole, but so low in the mammal group that they are not really mammals are the marsupials (kangaroos, opossums, etc.). Their young are so immature at birth that they are for some time carried in a pouch by the mother.

We have now come to the last great chasm—that between man and the other mammals.

As man belongs in the same group with them the chasm is not so great in the sum of physical characters as is that between the fish and the reptile groups, or between the reptiles and the mammals. In regard to man and the higher apes the dividing line, viewed from the standpoint of descent, is vertical rather than horizontal—like that between mammals and birds.

There are no species, extinct or extant, between man and the ape. It is not necessary for the proof of evolution that there should be. "Missing links" are not more required here than they are between birds and mammals which were evolved side by side from reptiles. If ten feet below the topmost bough of a tree there is another branch it is not necessary to show that there are, or have been, intermediate branches to prove that both grew from the same trunk. Missing links are required only *in the line of descent*.

Discoveries of the fossil remains of man are rare for many reasons. (1) Land animals rarely leave their remains in the sediment of sea and lake. (2) There is small chance of the sediment containing the fossils of recently arrived animals—more especially of man, the latest arrival—being lifted above the water level because of the slow movements of the earth's crust. (3) Only those animal remains that are buried in localities where they will be impregnated with certain mineral salts will be preserved. (4) They must be able to resist those destructive agencies (especially erosion by water) that disintegrate the rock in which they are embedded if they are to come down to us as evidence. (5) Only a small part of

the earth as yet has been searched, and nearly all the fossil discoveries have been accidental. For these reasons the geological record in respect to fossil evidences is far from complete. Yet from time to time new discoveries are filling in the gaps in the record.

Anthropologists present us with evidences of pre-historic races that were far lower than the lowest savage of today. Some of the evidences of man's existence tens of thousands of years ago were known before Darwin set the world astir with his revolutionary discovery, and the old school geologists, like Hugh Miller, who had not been entirely weaned from scriptural literalism were sadly puzzled in regard to the evidences of these "pre-Adamites."

Fossils have been found showing several gradations or stages in development intermediate between man and his pre-human ancestor—evidences which, if they do not completely bridge the chasm, stand as ruined pillars, broken arches, isolated spans of the bridge over which man was many hundreds of thousands of years in crossing.

The first skull discovered (sixty years ago) of the Neanderthal men was so entirely different from other pre-historic skulls that one scientist declared it was a mal-formation; but other fossils were found later that proved the peculiarities to be racial characteristics. These men, who lived in Europe down to thirty thousand years ago, were squat, bent-kneed, thick-skulled, almost chinless, and with ridge-like projections over deep-set eyes. In skull development they were lower than any savage of today.

Older than the Neanderthal race, and lower in the human scale, were the Heidelberg men, said to have been the first really human beings of whom we have fossil evidences. Judging from the age of the fossil beds they existed from 100,000 to 200,000 years ago.

Thirty years ago were found some of the fossil remains of a creature in Java, some forty feet below the surface, that show characters intermediate between the gorilla and the Neanderthal man; "the lowest human cranium yet described, very nearly as much below the Neanderthal as this is below the normal European." This creature was named *Pithecanthropus Erectus* (erect ape-man).

Lack of space prevents even a brief description of other and intermediate types of man, such as the man of Spy, of Naulette, of Predmost, etc.

As the more man develops (becomes specialized) the farther he is removed from the lower animals, so, in tracing his descent toward his origin we find him approaching them, apes included, in general characteristics, for we approach the point of divergence.

Evolution is a fact. There is no doubt of that in the minds of those who have investigated the subject without prejudice and with the acquisition of truth as the sole aim. One may dispute a fact, but he cannot deny it out of existence. Those who feel a sense of shame for their close proximity to their cousin, the monkey, are advised to increase that distance by carrying to higher development those traits considered peculiarly human: Reason, a sense of justice, of broader sympathy, and tolerance.

By his great discovery Darwin delivered the heaviest solar plexus blow to human vanity it ever received. For this he deserves, and receives, the eternal gratitude of every right-thinking man and woman.

How was evolution brought about? What are its laws, and how do they work?

NATURAL SELECTION

When the farmer or the stock-breeder selects his seeds or his animals for propagating purposes he has an eye to a great natural law, heredity. He knows that scrub animals and the seeds of degenerate plants will stamp their inferiority upon their descendants. He has learned that like produces like, therefore he selects such seeds and animals as will produce those best suited to his purposes. He is not only guided by his knowledge of a great law of Nature, but in the main he is following her method in preserving and improving the breed. This method of changing and improving plants and animals under domestication is called artificial selection.

Plants and animals in the natural state are capable of multiplying at so enormous a rate that there is an incessant struggle for existence going on among them. If it were not for this fierce struggle with one another and with their enemies and other environmental forces in which the vast majority die early, the world would be overstocked. There is hardly a species of animal of which a single pair would not choke out all other animal life in a few genera-

tions by filling the world with its descendants if all of the one species were permitted to reach old age. If a pair of elephants (one of the slowest-breeding species of animals) should bring forth only six young ones, and all should live to be one hundred years old, their descendants in 750 years would number nineteen million—a number so great that they would form a closely-packed herd occupying forty-one square miles. The codfish produces nine million eggs a year. If each egg should develop into a mature fish, half of them females, in ten years the sea would be a solid mass of codfish.

This tendency to increase at so tremendous a rate, and the fact that no two individuals are exactly alike, supply the material and the conditions for the great law of natural selection to operate. Each individual must of necessity compete so fiercely with other individuals of the same species, and of allied species, and with enemies, with climate and changing conditions that out of the struggling many only a few live to propagate. Those individuals that vary from the mass in the right direction live; the others die, leaving few descendants, or none.

Though like produces like there are no two individuals exactly alike. If all of the same species were alike there would be no opportunity for the law of natural selection to operate. Nothing but chance would determine in the struggle for existence which individuals would live to propagate their species and which would die without descendants. Nor would it matter, so far as the species is concerned. But individuals do differ in their traits in some degree

--Wallace has shown that variation usually amounts from ten to twenty, sometimes twenty-five, per cent of the varying part--and this variation, even if small, often spells the difference between an early death with no descendants and a long life with a numerous progeny.

By the law of heredity the descendants are endowed in a greater or less degree with the same life-saving characteristics of their parents. Each generation being subjected to this weeding-out process, and only a few of the best fitted individuals being selected to preserve the species, we can easily see that, as the generations come and go, those essential, life-saving characters or traits are being developed to a greater and greater degree. And this means change, modification of species.

With horn or tooth or claw or hoof or sting or poison or odor, among all the wild creatures that swim or crawl or run or climb or fly, the struggle for life and food and mate goes on today just as it has gone on for millions of years. Other factors in the struggle are alertness, agility, cunningness, sharpness of vision and hearing and smell, protective color of covering, fleetness of foot and wing, the degree of heat, the amount of moisture and the food supply.

The traits that survive are of course those that are the most useful in a given environment. (By environment is meant surroundings, all outside influences, the not-me of each individual.) A change of environment, of the conditions of life, calls for a re-adjustment of the traits most vital to the individual in the new environment. In one environment one

highly developed trait would be most useful while in another some other character or set of characters would be the saving factor, because a change of environment means a change of weather conditions, of the food supply and the means of getting it, of enemies, etc.

From the foregoing brief outline it would seem that only a little exercise of reason is required of any one to see that natural selection operating in unlike environments would, in the course of many generations, produce from the same species types of animals (or plants) very unlike—not only unlike each other but unlike their parent species. At first these types derived from a common ancestor would be only varieties, but varieties are incipient species. Given sufficient time, and the intervention of natural barriers to prevent the crossing of extremes, and the creation of new species would be the natural result.

As a vivid illustration of how the law of natural selection works, and of how great is the sum of the results of its operation accumulated through many generations, let us observe one of many modifications an animal undergoes in its struggle for existence. To the question, "Why are animals of the arctic regions white?" we ought to be able, with what we already know of natural selection, to give the answer. Imagine those lands of snow and ice originally inhabited by animals of all colors from white to black, or even of all shades of one color, brown. The animals of what colors or shades, among the flesh-eaters, would have the least difficulty in stealthily approaching

their prey, and so, be most apt to survive in the struggle against starvation? And which among the animals preyed on would run the least risk of detection and so be most likely to escape destruction? The answer to both questions, of course, would be, "Those whose colors most nearly conformed to the snowy background." Imagine this process of culling out the darker colors continuing for many generations and we can understand that the whiteness of all arctic animals would be the inevitable result. We can also see why most wild animals of our regions are of colors that best harmonize with the brown earth and dead leaves. Let us keep in mind the fact that while we were observing the modification of one character, all the favorable variations, however slight, in every other character that could be of the least advantage to those creatures were being added up as fast as they appeared. After several generations, if for any cause the environment were undergoing a radical change, or if a species had migrated from a widely different one, a greatly modified animal would be the result. However, there can be no modification in an animal perfectly adapted to its environment—provided the environment does not change.

Every organ, and every other part of the body, internal and external, of every creature in the natural state is subject to modification by the law of natural selection, just as was the color of the hair or the feathers of polar animals.

Man's method of improving plants and ani-

mals—artificial selection—interferes with the work of natural selection. For one thing, man makes a radical change in the environment of every plant and animal he domesticates; for another, man selects for other purposes than the one Nature has in view—that is, if it can be said that Nature has a purpose.

From the same parent stock man breeds one strain of cattle for beef, another for milk and butter; one variety of the horse for the saddle and another for draft purposes. Nature adapts the species to the environment—never the environment to the species—sacrificing those individuals that do not measure up to her standard. She seems to care only for the species, not for the individuals, or only for those individuals that give promise of a better species.

This secret wrung from Nature (natural selection as a factor in progressive development) is man's most precious truth, for it is the key to his further progress.

To summarize: organisms tend to increase at a great rate; this intensifies the struggle for existence; organisms vary; in the struggle for existence the vast majority die early, leaving those that vary in the favorable direction to live and reproduce; this means change, progress. This is natural selection.

There is also De Vries' "Mutations theory" which some scientists believe to have been an important factor in evolution. It is the theory that at times a species may progress by "jumps"—that is, that occasionally individuals come into existence that vary extremely from the mass, and that they may become the parents

of a new species. It is on account of the relative value attached by some scientists to this theory and to natural selection that they disagree, and not in regard to whether or not evolution is a fact.

NATURAL SELECTION IN SOCIAL EVOLUTION

The law of natural selection, or of the survival of the fittest, is not confined to plant and animal life. Its sway is universal. Every thing that is born, spawned, hatched, sprouted, conceived, invented, or founded is tested by this law, and if found inefficient, unfit, is weeded out, leaving the fittest, the best, the truest to survive.

On the mental plane the law of the survival of the fittest is often restricted in its operation, and the struggle unnecessarily prolonged, because of the intolerance of those of the older, dominant belief. The world lags because they refuse to permit the new idea to meet the old on equal terms before the only court having jurisdiction over truth and error—the court of Reason.

Intolerant people—and they are legion—either lack faith in the power of truth to triumph over error, or they harbor a lurking doubt in their own minds in regard to the amount of truth embodied in the belief they so anxiously shield. They regard belief—their belief—as something to be protected at any cost. Freedom of opinion, intellectual honesty, truth itself must yield rather than *their* belief be

in jeopardy. They seem to think it more blessed to believe something they received at second hand than to investigate and know the truth. With them it's "Believe so and so; open your mouths like young mocking-birds and swallow it, smack your lips and call it good." For people of that mental type to tell us to think—why, that is never thought of.

This forcing one to subscribe to a doctrine through fear, or to accept an idea on authority, belongs to the medieval age. And we resent it—we whose minds have not been altogether shaped by the kingly, priestly authority of five hundred years ago. We say, "Give us the evidences of your belief; if they are sufficient we cannot help believing. Let us meet in fair discussion and compare evidences. Drop your intolerance. Let your idea stand or fall on its merits—that's all we ask of ours. Let the law of natural selection have a chance to operate."

Not belief, but truth, is the one essential, and when discussion reveals the evidence supporting it belief is attracted to it like steel filings to a magnet. O ye of little faith, doubt not that in a struggle for existence between truth and error the fittest, that is, truth, will survive and error be eliminated.

Truth crushed to earth will rise again—

The eternal years are hers—

While Error, wounded, writhes in pain

And dies among her worshippers.

"A lie on the throne is a lie, still, and truth in a dungeon is truth, still; and a lie on the throne is on the way to defeat, and truth in a dungeon is on the way to victory."

"If there is anything that cannot stand the truth, let it crack."

EVOLUTION AND THE BIBLE

The Bible itself contains evidences of evolution. As the Jews climbed up in the scale of civilization their ideals, their conception of what should constitute a God, also arose. It is a far cry from the ancient Hebraic conception of God, down through the prophets to the idea of divinity as taught by Jesus. Let the reader lay aside his prejudice, if any he has, be honest with himself, and compare Jehovah of the early Jews with Jesus' portrayal of God as a father, as one whose synonym is live.

Jehovah, according to the early writers, was stern, wrathful, vengeful—"I will mock you in your calamities"; vain and jealous—"I, the Lord thy God, am a jealous God"; cruel—hardening the hearts of his powerless victims in order to punish them for doing what they could not help doing, and according to Joshua, Jehovah commanded him to kill all his enemies, old and young, even the children, and he gave the captured wives of the enemy to the soldiers of the Jewish army; deceptive—"I have sent lying spirits unto Ahab"; in short, and in very truth, he was a god having all the frailties and imperfections of man, and not man at his best either.

Take the Genesis story of creation:—When Jehovah created Adam he knew (being an all-wise God) that Adam would fall. Therefore, Adam could not have done otherwise than to

yield to temptation; for to have resisted would have proved God's foreknowledge false. Then why pronounce a curse on one (and his billions of descendants) for doing what God's foreknowledge made unavoidable?

Again it is said that when Jehovah made up his mind to destroy the human race "it repented the Lord that he had made man on the earth"—that is, he had made a mistake, like you and I, and was sorry of it, like you and I. How like a man was Jehovah in his shortsightedness!

And this is a part of that story of the origin of man which we are asked to accept by the anti-evolutionists instead of the scientific explanation.

Before history there was mythology. Beyond the earliest ascertained historic facts of every people, of every early nation, was a mass of myths portraying its childish beliefs concerning its origin, its gods, its heroes, etc. The Jewish nation was no exception. Scriptural literalists, those who believe in the verbal inspiration of the Bible, know that all ancient peoples had their myths—all except the Jews. In the face of a million facts they still contend that the impossible stories of the early Jews are true as gospel—in fact that they are a part of the gospel.

The greatest obstacle to the popular acceptance of the doctrine of evolution is a belief in the verbal inspiration of the Bible and its literal interpretation. The more conservative or orthodox element of the churches regards the Bible as a direct quotation of the exact

words of God. Their conception of inspiration is that the various writers merely held the pen while God caused it to move over the surface of the parchment tracing the characters that spelled his very words. The fact that the various books of the Bible are written in almost as many different styles would seem to disprove verbal inspiration to any thinking mind. Certainly, those books called the Bible are inspired, and in precisely the same sense as Shakespeare's plays, Burns' poems and Emerson's essays are inspired—that is, the writers felt strongly an impulse to write; and in every instance the writings were stamped with the individuality of the author.

All inspiration is not on the same level—the higher the spirituality the deeper the source. For example, as one writer has pointed out, when Paul said, "Alexander the coppersmith did me much evil; the Lord reward him according to his works," he was not inspired in the same sublime degree as was Jesus, when, rising above his own sufferings, he remembered his tormentors in the prayer: "Father, forgive them; they know not what they do."

The belief in verbal inspiration has scotched the wheels of progress at every turn. Four hundred years ago those who taught the roundness of the earth were denounced as heretics. It was a belief in verbal inspiration that inspired the church to force Galileo, who taught that the earth is not the center of the universe, but that it revolves around the sun, to make the recantation: "I, Galileo, being in my seventieth year, being a prisoner and on my knees before

your eminences * * abjure, detest and curse the error and the heresy of the movement of the earth." Even Newton's great discovery of the law of gravitation was denounced as "subversive of natural, and inferentially, of revealed religion."

A hundred years ago the use of anesthetics in childbirth was opposed in Scotland on the ground that it was seeking to remove the curse God had placed upon the daughters of Eve for her transgression.

King Charles of Spain declared that the digging of a canal across the isthmus of Panama, thus severing North and South America, would be a sin; for is it not written: "What God hath joined together let no man put asunder"?

In America the famous Rev. Cotton Mather wrote a letter to John Higginson informing him that the "general court" had given secret orders to a sea captain to waylay William Penn and the one hundred Quaker colonists—"heretics and malignants"—who were then on their way to Pennsylvania, capture the "ungodly crew" and sell them "to Barbadoes, where slaves fetch good prices in rum and sugar," for in so doing "the lord may be glorified and not mocked on soil of this new country," closing his pious letter with the felicitous phrase, "Yours in the bowels of Christ."

In 1826 the school board of Lancaster, Ohio, refused to permit the use of the schoolhouse for a debate as to whether railroads were practicable. The letter reads: "You are welcome to the schoolhouse to debate all proper questions in, but such things as railroads and tele-

phones (the possibility of which were talked then) are impossibilities and rank infidelity; there is nothing in the Word of God about them. If God designed that his intelligent creatures should travel at the frightful speed of 15 miles an hour He would have clearly foretold it through his holy prophets. It is a device of Satan to lead immortal souls down to hell."

Is there needed stronger proof than this of the mental slavery to which the belief in verbal inspiration reduces its devotees?

Today those who oppose evolution for biblical reasons occupy the same absurd position as those who persecuted Galileo, denounced Newton, opposed the use of anesthetics in childbirth, thwarted the digging of a Panama canal, regarded the introduction of railroads and other industrial innovations as tricks of the devil to damn our souls, and approved the selling into slavery of the adherents of a rival Christian sect.

This medieval belief of verbal inspiration has filled the Christian world with strife and intolerance, and has drenched its soil with the blood of tens of thousands of "heretics." It was this belief that for hundreds of years impelled whatever sect that had the power, be it Catholic or Protestant, to persecute, imprison, torture, burn, kill in every conceivable way those who differed with it in the interpretation of certain scriptural texts. This narrow, intolerant belief, the very negation of the Christ spirit, lives today—but, thanks to modern science and intellectual progress, its teeth are drawn.

Let us get this straight: evolution is not, in the slightest degree, opposed to religion; but it does conflict with the noxious growths of superstition and doctrinalism which half-conceals religion. True Christianity will shine all the brighter with its concealments cleared away. The study of evolution broadens and enlarges one's conception of religion. Those who are afraid that to accept evolution would cause them to "lose their faith" are already weak in faith.

Those who insist on, as of paramount importance, a belief in some mystical "plan of salvation," including certain rites to be observed, are Paulinists rather than Christians. Scattered throughout Paul's writings are expressions regarding the fall of Adam, the total depravity of man, the atoning blood of Christ, etc., which are harmless enough if regarded simply as rhetorical flourishes, but linked up in a finely wrought out scheme of redemption, and coupled with an insistence on the absolute necessity of belief in the same as the only means of individual salvation—why, this Pauline gospel has catered to human selfishness, has filled the world with theological disputations and sectarian strife, and has relegated into the background the great, yet simple spiritual truths of the lowly Nazarene. As a doctrine, its mysticism has a natural affinity with inherent superstition, dregs of which lie at the bottom of every human soul.

It is Jesus' persistent insistence on the duty of each to serve humanity that made him a great religious teacher. And it is His teachings, if we heed them, that will "save" us, and

not his shed blood; *that* dried up within a few hours of his crucifixion. To say that we are "saved by the blood of the lamb" is a fine figure of speech, though a well-worn one. Of course, the martyrdom of Jesus adds emphasis to the truths be expounded, but it makes them not one whit truer than they were.

Will the verbal inspirationalists please tell us when God quit sending messages to the world couched in his own words? It may be that that kind of inspiration ceased before Paul began preaching. If so, Paul is no greater, *as an authority*, than Whitefield or Moody.

There is no reason why we should not read the Bible just as we would any other book, with reason enthroned.

POPULAR OBJECTIONS ANSWERED

Note.—The following objections to evolution with replies thereto are taken from a debate which the writer and several anti-evolutionists conducted some time ago through the columns of a popular weekly.

An opponent says: "The evolutionists are trying to rob God of the honor of creation by substituting certain natural laws for his omnipotent power. This world and all therein didn't 'just happen'; it was created on purpose. We oppose this Darwin heresy because it conflicts with the divinely-inspired word of God.

. . . My opponent should be more positive in some of his statements and not say, 'So-and-so is the opinion of scientists. if he would have us forsake our old beliefs and adopt his. . . .

In regard to that crust of conservatism of ours which he says is so thick and hard that the truth cannot percolate through it—I, for one, would rather have a defensive armor so tough that lightning could not ‘faze’ it than be so spongy as to absorb every *ism* I came in contact with.”

Is it a reflection upon the power, the glory, and the dignity of the Almighty to say that the creative act was by the operation of natural law—a slow, gradual, long-continued act—rather than a short, quick, mechanical, or supernatural, process? Before the dawn of science even the brightest minds, knowing little or nothing of the law of cause and effect, could not conceive of God as performing his mighty works save in some manlike manner. It seems that they had the idea—and a great many still have it—that during those six days of twenty-four hours each the Creator went about his work at his little old mud-mill, mixing and grinding the material, and shaping and moulding it into all sorts of animal forms on his potter wheel. It is time for the world to rid itself of the primitive idea that man originated as a sort of hand-made, table-turned piece of pottery.

Others say that God merely “spoke” all things into existence. If that view be correct, then according to the rest of the Genesis story of creation God became so tired from this lingual feat of six days’ duration that he was compelled to take a rest at the week’s end. Is it possible that a God of infinite power and endurance should become so weary with a

week's work, either of hand or tongue, that he would require a rest?

There is not the slightest evidence that God ever did an hour's work save through natural law.

Between the scientists and the literal interpreters of the Bible the war has been long and fierce, and has raged on many a battle front; but so far, the scientists have won in every contest. There was once a battle between the scientists and those who believed the earth to be flat—for did not John, the Revelator, see four angels standing on the four corners of the earth? The literalists were defeated. There was once a contest between the astronomers and those who believed the sun and moon revolved around the earth—"And he said in the sight of all Israel, Sun, stand thou still upon Gibeon; and thou, Moon, in the valley of Ajelon . . . So the sun stood still in the midst of heaven, and hasted not to go down about a whole day" (Joshua, 10:12, 13). The literalists were defeated. There was one a clash between the geologists and those who believed the world to have been created in six twenty-four-hour days. Again the literalists were defeated. There is a combat between those who hold the view that all organisms including man were created by natural laws—operating just as they do today—and those who hold to either the potter or the vocal process of creation. The latter—well, they occupy the same position as those did who said the earth is flat; and that is was made between the blink o' morn on that great

First Monday 6,000 years ago and the evening twilight the following Saturday.

Scientists do not claim that life on this earth began by accident, or that anything "just happens." On the contrary, it is owing to science that a belief in accidents and chance in the material world has been banished from thinking minds. It is true that a great majority of the people still believe in chance in the psychic world; such as, a certain individual prompted by certain motives, and acting in accord with his nature under certain conditions, did a certain thing, when the same individual prompted by the same motives could have done otherwise—that is to say, the same causes acting under the same conditions can produce effects of various kinds, either good acts or bad acts. But science will finally force the world to accept the whole truth—that mind is as much subject to law as is matter; that the thoughts, desires, deeds of men are shaped by law.

Scientists are trying to teach us to exercise our powers of reason, to form our own opinions from the evidence, not passively to accept opinions on authority. Their method is the direct opposite of that of the orthodox theologians. The latter wish us to regard authority, in matters of religion especially, as superior to reason. No, Mr. Opponent, I don't wish anyone to forsake his old belief and accept mine on my authority—or that of anyone else. Let reason and evidence be the only authority.

To win converts to evolution is not my only object in discussing the subject. What is quite as important (and, frankly, to me as enjoy-

able) is to make use of the opportunities the discussion affords me of giving a sort of fifth-rig dig o' the thumb to those complacent ones who (judging by the manner they acquired, and still retain, their beliefs) seem to think that the mere accident of one's birth and parentage in a certain time and place, thus bringing him in contact with certain prevailing opinions, is proof that those opinions are true.

This writer is speaking largely from his own mental experience. He, like his opponent, absorbed orthodox theology along with political standpattism and a few other "safe and sane" *isms* from his early environment. My opponent, like most others, never thought of questioning the truth of those beliefs, but left them undisturbed until they fossilized. On the other hand some of us, perhaps because of a radical twist in our mental make-up, set ourselves to examining those hand-me-down beliefs and found some of them lacking in some important essentials. Having changed sides on one or more important questions we naturally lost faith in the more-or-less popular theory that because an idea is old, or is held by a majority of the people, it must therefore necessarily be true. That is the extent of this writer's "sponginess." As a rule when we have learned that we have absorbed most of our political, religious and other early opinions from our environment through the pores of our skin we become less cock-sure we have a monopoly on truth.

As a rule latitude and longitude instead of reason shapes our opinions on the most impor-

tant issues. We are generally Protestants, Catholics, Mohammedans, Confucians, Monarchists, democrats or republicans, according to whether we happened to be born and reared in Spain, Turkey, China, Mississippi or Vermont.

An old English Philosopher says: "Men have always thought and believed in masses. Throughout the whole earth you may observe opinions and ideas, like swarms of bees, clustering together upon particular spots, or as if, like certain trees and plants, they were indigenous to the soil." Another writer says, "Men think in packs as jackals hunt."

A young minister exclaims: "There is a gulf between man and the inferior animals which no amount of sophistry, alias science, can ever bridge. There is more than a missing link—a thousand links. Man differs from animals in mental faculties. Lower animals cannot originate an idea. . . . If man was evolved from a beast, where did he get his soul? You cannot say it evolved, too. There was a definite hour when man, possessing an immortal spirit, walked this earth, or else man is yet a beast.

"If the soul was slowly evolved, and if that long-tailed monkey who squatted upon the lower branches of your ancestral tree had a piece of a soul, and you should meet that poor little piece of a soul in the future land of spirits, wouldn't you be 'sorter' ashamed on the morning after the Resurrection to walk up to it and say, 'Howdy, Grandpa?'"

"You may boast that your grandfather was a monkey, your great-grandfather a bullfrog,

and your great-great-grandfather a wiggletail but I claim for mine no such illustrious ancestry."

Well, that settles it! To save our pride—or our vanity rather—I suppose we'll have to shut our eyes to the evidences and reject evolution. After all, perhaps the world's greatest thinkers have been following the wrong trail in the pursuit of truth; instead of weighing the evidence for and against a theory they should have adopted the infinitely simpler plan of deciding it according to whether or not we like it! All anti-evolutionists find it necessary to appeal to our pride of ancestry to hold us to an ancient dogma. Even Mr. Bryan regards this appeal to petty personal vanity as legitimate argument against evolution. How they hate to give up the ennobling idea that we are the degraded descendants of a perfect, god-like pair!

Are the lower animals so very inferior to man because, as my friend says, they cannot originate an idea? Lots of us higher animals could plead guilty to the same charge; and, what is worse, two or three generations must pass before the majority of us will even seriously consider an idea some one else originated—even when all the facts are for, and none against it.

It is not necessary to bridge every gulf between man and amoeba to prove evolution. If all gaps between species were filled with "links" as thick as down on a goose's feather then all creatures from Shakespeare to angle worms would belong to the same species. In that

case all animals would be either poets or fish-bait.

I know of no reason why man evolved from a lower mammal could not have acquired a soul just as easily as if he were fashioned directly from a batch of mud. And I infer from that sublime paragraph of my reverend friend's closing with the touching salutation, "Howdy, Grandpa,"—whoop-ee!—that his idea of heaven is that it is just about as stagnant a place as he believes this world to be. May not poor little stunted souls—if there are such there—be permitted to unfold and develop in the genial environment of the realm of the blest?

My opponent seems to be perturbed in regard to the exact period in the development of the race, "the definite hour," when man came into possession of a soul. To this question let us apply cold, merciless logic. The biologic history of the human race is recapitulated in the embryonic life of each individual. There are no difficulties in the way of determining at what precise period the soul was injected into the race-man that are not also met with in regard to the individual. My reverend friend, can you point out the "definite hour"—why not definite minute, or second?—when in your embryonic development you became possessed of a soul? And just three seconds before that event were you not in as woeful a plight as any soulless monkey that ever cooled himself by swinging to and fro, suspended from a leafy bough by means of his prehensile caudal appendage?

Is it not possible that a little bit of envy of

that large-souled race of the future does not mingle with your shame of an animal ancestry when you rise and exclaim, "Away with the theory of the upward trend in God's works; I will none of it?"—for it is a fact that whatever sense of shame one may feel for our lowly ancestors it is more than compensated for by the pride one may feel for the noble race that is to be; because if the path along which we have travelled in past ages points downward in the rear, it just as surely points upward in front. Our destiny will be as high as our origin was low. And as man drops his foolish prejudices and grows more intelligent, as he learns more about the laws of his development, the more rapidly will he advance physically, mentally, spiritually.

Ah! Parson, far better to be the tadpole ancestor of an ever-progressive angel breed than be the degraded descendant of a race of gods; yet a race without hope of ever again reaching the much-lauded, pristine purity and perfection of Adam—a creature really whose moral status was so low, and who was so weak, that he fell at the first temptation.

Civilization, culture, the moral nature of man, have been developed; they are not the remains of something that has been lost. Human nature is not ruined, but is unfinished. The god-like race is not of the past, but belongs to the future. Man entered the zone of sin not from above, but from below. Probably no man who ever walked this earth save Jesus Christ has ever breathed the pure moral atmosphere above the zone of sin. Through this

zone, from the pre-human to the man of Galilee, from the sinless state of the lower animals and of the child-man to the sinless perfection of the divine, the whole race, 'mid struggles and trials and sorrows and anguish, must pass, is passing.

NATURAL SELECTION AND FUTURE PROGRESS

Every truth man has discovered, every sound moral precept, is rooted in Nature. She is the rough model to be followed by man if his institutions are to endure. He goes wrong when he opposes her laws; he is right when he is in agreement with her, refining away her crudeness. Man creates nothing; he can only imitate, often poorly. He boasts of his works—really they are the product of Nature working through him, using him as an instrument.

We have seen that Nature does not hesitate to destroy the individual if the species to which it belongs is thereby benefitted. She looks beyond the present generation to the welfare of the race that is to be, thus teaching us the highest morality we can know, the broadest religion, i, e., that the good of the race, the COMMON GOOD, is all important, and that the individual should willingly sacrifice his labor, his life, when the good of humanity demands it. Jesus Christ, Socrates, and a host of less known martyrs have proved their devotion to the common good by making the supreme sacrifice. In so doing they have hewn to the line

chalked out by Mother Nature eons ago when inorganic matter first felt the stir of life. Jesus was announcing this principle when he said, "For whosoever will save his life"—strive for self alone—"shall lose it; and whosoever will lose his life for my sake"—and the sake of humanity which Jesus himself valued higher than his own life—"shall find it." Though only a few will have occasion to suffer martyrdom, the call to all of us is to live the life of unselfishness, be the end what it may. To live for the race is just as noble, if less dramatic, as to die for it.

Thus we find that Nature's most vital principle is in perfect accord with the profoundest religious truths. We have been taught that Nature is cruel, that her hands are red with the blood of the innocent, but this idea was born of our short-sightedness. We could not see beyond the outward act to the underlying law and its results.

For man so to shape his life and deeds as to be in harmony with the great law of natural selection and with the fundamental principle of religion does not mean self-effacement, the suppression of individuality. On the contrary, it means self-development, individuality in the best sense. As a species or a race is composed of individuals, the more highly developed are the individuals the greater the species. Self-development is the growth of the individual out of narrow selfishness and in accord with the laws of human betterment. Selfishness expanded, refined and ennobled becomes altruism, the love of others.

That the selfish person defeats his own ends, cheats himself, is a truism. Only the unselfish person, holding humanity dearer than his own self, enjoys to the fullest all that belongs to selfhood, for he alone has the capacity for real enjoyment—or deserves it. The supremely selfish—the criminal, the grafter, the one who seeks to profit in any way at the expense of others—stands in the same relation to his race as the inferior animal to its species—he pulls down the average of the race, and is at cross purposes with Nature.

To condone in one's self any of the many forms of selfishness, whether it be greed, theft, lying, lust, or vanity, is to put one's self in the same class with those defective wild creatures which Nature ruthlessly destroys.

When a great ethical doctrine is grounded on a scientific basis it becomes doubly convincing. Let the whole truth in regard to each individual's duty to the race be taught—the scientific half of it along with the emotional, idealistic half. No one who feels the full force of this truth will, in order to "make a living," take out of the COMMON GOOD fund more than he puts into it, but less, rather. It should be instilled into the minds of youth that the welfare of the race is the supreme duty of each, and that the greatest individual happiness is attained only through the self-development and self-expression of the individual along this line. But, alas! the enlightened legislatures of some of our sovereign states have forbid the teaching of natural selection to children. The reason given is that it might rob them of their religion!

The time is near when the conduct of man in every field of endeavor will be tested by the standard of loyalty and devotion to the common good. Certain gainful occupations injurious to the common welfare are already gone or going. Eliminated as unfit will be the greedy parasites that fasten themselves onto the social body on pretense of aiding some industry to function, and who give little or nothing in return for the public pap that fills their maws to repletion—eliminated just as Nature eliminates the animal that would bring degeneracy to its species. They will be forced to take up a work wherein their services shall equal their pay. The route between the producer and the consumer will be shortened, and the two will stand nearer on a level—as viewed from the price of the product.

This lesson from the book of Nature we have been studying has a universal application. Its truths are applicable in every field and department wherein man and his activities are employed—in private conduct, religion, government and industry.

* * *

Of all animals man is most subject to disease and defect in body and in mind. Sickly, or mal-formed wild animals are so rare as seldom to be seen. This is almost as true of domesticated animals, though epidemics sometimes sweep them off. Animals mentally defective are almost unknown. But man is assailed with a thousand ailments. Defective organs, functional disorders, chronic invalidism are common. Malformations of body, also of brain

causing idiocy, stupidity, insanity and crime, are a hundred times more frequent in man than in lower animals, wild or domesticated. Why this difference? The answer is easy for anyone familiar with the laws of evolution.

The sedulous sifting by natural selection of animals in the wild state has left no sickly or half-witted degenerates to burden the world with a like progeny. If at rare intervals the law of variation should drop a mal-formed specimen into Nature's sieve it would be quickly eliminated along with the great mass of averages. Practically the same is true of domesticated animals where the watchful eye of man is substituted for Nature's.

As natural selection is hampered in its operation among domesticated animals by the interference of man, so is it limited on the human plane. There, we find virtually no selection, neither natural nor artificial. Hence the degeneracy—physical, mental, moral. Both Nature and man, in their respective fields of operation, select only a few of the best for propagating purposes — Nature eliminating the rest by death, and man by sterilization. But on the human plane man—acting mercifully toward the individual, mercilessly toward the race—does his best to thwart Nature. He prolongs the lives of weaklings, of the maimed-from-birth, of the deaf and dumb and blind, and of the mentally sub-normal. So far, all is well. But he permits these victims of an inferior ancestry to marry and procreate almost without limit. What then can we expect but for the world to be burdened with invalids,

runts, and the mal-formed—cursed with morons, sub-morons, half-wits, quarter-wits, and predestined criminals? And worse for the entire race, this class shades upward by imperceptible degrees into all gradations, mingling its inferior strains with the best. It has always been so; therefore all of us, far more than wild animals, have a mixed ancestry, of the good and the less good.

Why is it that man has not learned to rid himself of this lower fringe of degeneracy as is done in the case of every other species of animal? It is mainly because the superstition of an out-worn theology has so muddled his brains that he has been unable to see that the laws of Nature are as applicable to himself as to all other creatures. He has always fancied himself as occupying a higher plane than that on which Nature has her laboratory. So he has always depended on "divine" laws, not those of "carnal nature," to plant his feet on higher ground. And we see the result. Notwithstanding his high intellectual and moral faculties, as a race, he is the most defective animal on earth. What is the remedy?

If we would solve this pressing problem we must apply the laws of Nature to man in some such manner as they have always applied to the rest of the animal kingdom. The unfit must be prevented from reproducing its kind. How? There are only two methods: Nature's, by bringing about the death of the unfit prospective parent, and man's, the sterilization method. But among the better traits of man which have been slowly evolved in his age-long struggle reaching back to an immemorial

past is sympathy, mercy. This bars him from using Nature's method of preventing undesirable offspring; nor can he use the sterilization method except in extreme cases. Born criminals, perverts, and other abnormal misfits who persist in indulging their selfish passions in detriment of the Common Good—for such, comprising perhaps 5 to 10 per cent of the race, sterilization is the quickest and surest preventive. Once the milder type of defectives are made to realize the heinous crime of bringing degenerate children into the world they would in most cases refrain from marriage and procreation. Wise restrictive laws and an awakened public opinion would do the rest. This eugenical system is the only one that promises hope for the salvation of the race. From generation to generation, owing to the fecundity of the less fit and their proneness to "let Nature take her course," their numbers increase, and so, too, the danger increases of their swamping the fitter.

* * *

From the exposition of natural selection it will be seen that all the laws of organic development—either of individuals, varieties or species—fall under two heads: those of heredity (the harking back to ancestral characters) and those of environment (all outside influences). Variation, which seems so contradictory of the law of "like producing like," is in reality a result of heredity. Offspring inherit traits, more or less repressive in one or both parents, in different degrees—this is variation.

The gist of the matter is: heredity transmits

to environment the ancestral traits or characters, good and bad, of each creature. From these inherited traits environmental laws select and nourish those best fitted to each particular environment, and neglect, repress or destroy the less fit. At the birth of the individual heredity has done its work, for good or ill; then environment receives the legacy bequeathed by its ancestry and completes the job—whether for the individual's weal or woe depends both upon the quality of the material heredity handed down, and upon the character of the particular environment that works upon the material. As prior to birth heredity is the only factor in producing the individual, the absolute necessity of preventing the reproduction of the unfit, the inferior, becomes apparent; as after birth environment is the only factor, or sum of factors, in his production, the making the best possible environment for every one is the one absolute essential.

The individual man, no less than other organisms, is a creature of heredity and environment. This is as true of his intellect and of his moral character as of his body. He is not a thing separate and apart, but a link in the chain of cause and effect. He is orbit-bound as planets are. Every thought of his brain, every desire of his heart, every deed of his hand is a natural and (circumstances considered) unavoidable result of the laws of Nature working in and through him—as surely as every cause produces an effect and that every cause is itself an effect of a prior cause. In cases where opposing forces or influences tend

to move the will in different directions it obeys the stronger—follows the path of least resistance. It cannot do otherwise—no more than Newton's apple could have moved toward the moon.

Scientists are generally agreed that none but "inborn" traits, the inherited ones, are transmissible to posterity—though Dr. Kramerer has recently furnished some evidence to the contrary. If the generally accepted view be the true one, then of course "acquired" characters—the "improvements" of environment—die with the individual. Certainly, environment cannot put into the individual what it had no capacity for at birth; it can only develop what is already there. Hence the conclusion: We may, we must, improve the environment for the good of the living generations as they arise; but above all, prevent the reproduction of the unfit for the incalculable benefit of the countless generations that are now waiting their turn in the womb of the future.

* * *

Man is such an egotistical creature—being a near relative of the gods, as he imagined, and being specially created and made lord over the other creatures—that he has always regarded himself as above and beyond Nature and not subject to her laws, or only so far as his body was concerned—that being the one link connecting him with Nature.

As the little boy evolved from his inner con-

sciousness his idea of the camel, of which he had never seen even a picture, so man in olden times evolved his theories of the origin of the world and of himself, and the part he was to play in life. According to his primitive way of thinking, the earth—which he regarded as the center of the universe—was a very small affair, over which Nature presided as a sort of satrap whose rulership was subject to interference at any time by the Great King. According to his theory there were two sets of laws, natural and divine, and they were often in conflict with each other. But man always had the right to appeal his case to the higher authority when not satisfied with Nature's rulings. She had neither part nor jurisdiction in the human mind or soul—that coming not by way of her but directly from God.

This was essentially the belief of millions for thousands of years, and it is the belief of millions today. This is the soil in which nearly all the creeds of today are rooted.

The old theologians made a distinction between God's works and Nature's works, divine laws and natural laws. It is because of this dual idea of God and Nature that the most fruitful scientific discovery of all time is barred from the schools in some states and denounced as "atheism" from many a pulpit. Those who hold to the old theology do not realize how completely science has destroyed the foundations of their ancient belief, nor have they any conception of what an incalculable service modern thought has been to religion in clearing it of its impediments.

The bringing of science and reason to play in the progress of man, the bringing of the blind forces of Nature more and more under subjection to his enlightened intelligence—this is but Nature exalting herself. Having built up a higher plane, the human plane, Nature works upon that to refine and ennoble herself—not purposely, or only so far as man works with a purpose. All, all is Nature.

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